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most difficult problems that the study of the origin of coal and other fossil combustibles presents. It should be carefully studied from that point of view.

Neither should the fact be left unstated that in these difficult and recondite researches M. Renault has advanced theories that are not accepted by all, but the criticism and, if need be, the disproof of which belongs to those who are engaged in the same line of investigation and are equipped for such a task.

LESTER F. WARD.

The Elements of Astronomy. By Sir ROBERT BALL. New York, The Macmillan Company. 1900. 183 pages, 23 figs., and 11 full-page plates. Price, 80 cents.

This little book contains a clearly written account of astronomical subjects, adapted to the needs of beginners. After a brief historical introduction and an explanation of the apparent diurnal motion of the celestial sphere, the Sun, as the heavenly body most important to us and most interesting to the novice, is rightly placed first. If any change were to be suggested here, it would be that this topic should receive fuller treatment and more complete illustration. The author's admirable *Story of the Sun*, which is both accurate and interesting, fits him to present this subject advantageously.

It is to be regretted that the eclipse photographs, which are supposed to show solar prominences and the corona, are so badly reproduced as to be almost worthless; and while the introduction of photographic illustrations directly from nature is very desirable, the public has a right to demand that such pictures in a work of more than ephemeral value shall have that degree of precision which modern art processes are able to give. In case the publishers have not at their command facilities for reproducing pictures with delicate details, a well-executed engraving, correctly interpreting such details, is to be preferred to a poor photograph. Good illustrations are given of the Full Moon, Saturn, Jupiter, the Dumbbell Nebula, and clusters in Hercules and in Perseus.

Since one of the objects of scientific study is

to inculcate conceptions of precision, the indiscriminate grouping of stars of several orders of magnitude from Sirius (-1.5 mag.) to Capella (0 mag.) under the title 'first magnitude' stars (p. 7-8) is to be deprecated.

In an edition prepared for American readers it might be well, if a common name is to be used, to substitute The Dipper for The Plough in designating a part of Ursa Major which 'in this country' is familiarly known by the former title.

A similar remark applies to the statement on p. 57 that midsummer twilight in 'our' latitudes lasts all through the night, which lacks generality and is inappropriate in a science whose chief merit as a discipline for young readers is that it tends to broaden our conceptions by wiping out local distinctions.

The author's familiarity with mathematical processes gives him a firm grasp on everything of a geometrical nature, but also a beautiful simplicity and directness in his demonstrations, which does not always follow from individual comprehension. The chapter on the diurnal motion is simplified by the omission of some details which would have to be considered in a more extended treatise; but one cannot omit to note that quite apart from this, the method and language of the demonstration are uncommonly clear and convincing.

It is natural that we should expect the same clearness in those subjects which Sir Robert Ball has made peculiarly his own—such as precession and the tides—and the reader will not be disappointed here. The history of the Earth-Moon system and the chapter on gravitation will be found especially interesting.

It is permissible, even in an elementary treatise, that an author should develop somewhat those parts of the subject on which he is an authority and where he can speak better than any one else; and since a selection has to be made in a small work like this, it is just as well that the illustrations chosen should be those most familiar to the author; but there are other inequalities which cannot be commended.

A considerable space is devoted to an argument as to the exceedingly high surface-temperature of Jupiter, which is purely speculative,

and by no means as probable as the author maintains. The oceans of boiling water remind one of the cataclysmal hypotheses in vogue in earlier geological speculation, and raise the question whether here also there may not be a less sensational interpretation of facts.

The lunar temperature, on the other hand, in regard to which we have some knowledge derived from quantitative measurements, is not so much as mentioned in the book.

Barnard's fifth satellite of Jupiter is given a whole page, which, while commendable as an account of recent astronomical progress, seems to show a lack of perspective, since only an equal space is devoted to the other four moons with their wonderful harmony. Moreover, in spite of the prominence given to this excessively minute body, the moon, which continues to be called by an anachronism by the Roman numeral I, is alluded to as 'the innermost.'

The 'invisible rays' of the solar spectrum are treated as if they were synonymous with the ultra-violet rays. Over a page is given to this topic, but there is no mention anywhere of the much more extensive infra-red part of the spectrum which comprises rays of greater intensity and of more importance to the earth.

The statement on page 39 that 'we find each one of the multitude of lines in the artificial iron spectrum agreeing to the last degree of precision with the corresponding line in the solar spectrum,' is not in accordance with facts. Along with many wonderful coincidences, there are some notable differences which are of very great importance as furnishing a possible key to further solar mysteries.

The description of the solar corona and of sun-spots in Chapter II. is inadequate, and something more than a bare mention of the fact that there are different classes of stellar spectra is desirable; but the list of shortcomings is not long, and the book is to be commended for its attainment of an exceptional standard of excellence.

F. W. VERY.

GENERAL.

ANNOUNCEMENT has been made by a committee of American anthropologists, of which Mr. F. W. Hodge, managing editor of the

American Anthropologist, is secretary, of the proposed publication of a series of more than thirty folk-tales recorded and translated by the late Frank Hamilton Cushing during his long and intimate association with the Zuñi Indian tribe of New Mexico. The price of the work will be \$3.50. Information and subscription blanks can be supplied by the Secretary, whose address is Washington, D. C.

THE late Professor A. W. Hughes, left in an advanced state of preparation a new volume on practical anatomy. Professor Keith, of the London Hospital College, has undertaken to complete Professor Hughes's work, which will be published by Churchill.

BOOKS RECEIVED.

Experimental Psychology. E. B. TITCHENER. New York and London, The Macmillan Company. 1901. Volume I. Part 2. Pp. xxxiii + 456. \$2.50.

Human Placentation. J. CLARENCE WEBSTER. Chicago, W. T. Keen & Co. 1901. Pp. 126 and 30 plates.

Studien über die Narkose. E. OVERTON. Jena, Fischer. 1901. Pp. x + 195. \$4.50.

Morphology of Spermatophytes. JOHN M. COULTER and CHARLES J. CHAMBERLAIN. New York, D. Appleton and Company. 1901. Pp. x + 188.

Les problèmes de la vie. ERMANNO GIGLIO-TOS. Turin, Chez l'Auteur. 1900. First Part. Pp. viii + 286. 10 fr.

Clays of New York, their Properties and Uses. HEINRICH RIES. Albany, University of the State of New York. 1900. Pp. 593-944.

The Manual of Laboratory Physics. H. M. TORRY, and F. H. PITCHER. New York, John Wiley and Sons. London, Chapman and Hall, 1901. Pp. ix + 288.

A Select Bibliography of Chemistry. 1492-1897. Section VIII. Academic Dissertations. H. CARRINGTON BOLTON. Washington, D. C., Smithsonian Institution. 1901. Pp. iv + 534.

SCIENTIFIC JOURNALS AND ARTICLES.

The *Journal of the Boston Society of Medical Sciences* for December 18, 1900, delayed on account of the plates, has recently been issued. It forms a volume of 180 pages and 16 plates after photomicrographs, devoted to 'A Study of the Bacteriology and Pathology of Diph-